Third Five-Year Review Report
for
Douglas Road/Uniroyal, Inc. Landfill Superfund Site
Mishawaka, Indiana
St. Joseph County

August 2012

PREPARED BY:

United States Environmental Protection Agency
Region 5
Chicago, Illinois

Approved by: Date:

Richard C. Karl, Director
Superfund Division

8-20-12

Third Five-Year Review Report
Douglas Road Landfill Site
Table of Contents

Tables

Executive Summary

The remedy for the Douglas Road Landfill Site (Site) in Mishawaka, Indiana, includes three components: the extension of municipal water to approximately 95 homes, the installation of a multi-layer cap (OU-1) and the construction of a groundwater extraction and treatment system, including the construction of an artificial wetland treatment system (OU-2). The Site achieved construction completion status with the signing of the Preliminary Closeout Report on September 19, 2000. The second five-year review was completed on September 11, 2007 and is the trigger for this five-year review.

The remedy at OU-1 protects human health and the environment in the long-term because there is no evidence of exposure to Site contaminants and the existing use is consistent with the stated objectives of the land use restrictions. The construction of the multi layer landfill cap, the collection of landfill gas and the maintenance of the Site perimeter fencing and signage effectively limit exposure to Site contaminants. Institutional controls in the form of a recorded restrictive covenant will ensure that the cover remedy remains protective in the long-term.

The remedy at OU-2 protects human health and the environment in the short-term because the remedy is operating as intended, treated groundwater is meeting stated standards and there is no evidence of exposure to contaminated groundwater. To be protective in the long-term, cleanup goals must be met for groundwater. Additionally, U.S. EPA must evaluate whether institutional controls are needed to prevent exposure to groundwater off-site and implement any necessary institutional controls until the cleanup goals are achieved.

The remedy protects human health and the environment because there is no evidence of exposure to site contaminants and the existing use is consistent with the stated objectives of the land use restrictions. The groundwater pump and treat system is operating as intended. Institutional controls have been recorded on the property as an environmental restrictive covenant that prevents interference with the cap and prohibits use of the groundwater under the Site. The remedy will be protective in the long-term when cleanup goals for groundwater are met. Additionally, U.S. EPA must evaluate whether institutional controls are needed to prevent exposure to groundwater off-site and implement any necessary institutional controls until the groundwater cleanup goals are achieved.

List of Acronyms

CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
HI	Hazard Index
IDEM	Indiana Department of Environmental Management
MCL	Maximum Contaminant Level
NCP	National Contingency Plan
NPL	National Priorities List
PA/SI	Preliminary Assessment/Site Investigation
O&M	Operation and Maintenance
RD/RA	Remedial Design/Remedial Action
PRP	Potentially Responsible Party
RAO	Remedial Action Objective
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
SVOC	Semi-Volatile Organic Compound
UU/UE	Unlimited Use/Unrestricted Exposure
VOC	Volatile Organic Compound

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site name: Douglas Road/Uniroyal, Inc., Landfill		
EPA ID : IND980607881		
Region: 5	**State: IN**	**City/County: Mishawaka/St. Joseph**

SITE STATUS	
NPL status: Final	
Multiple OUs? yes	**Has the Site achieved construction completion?** Yes

REVIEW STATUS
Lead agency: EPA
Author name (Federal or State Project Manager): Dion Novak
Author affiliation: US EPA Region 5
Review period: 01/15/12 to 4/1/12
Date(s) of Site inspection: 3/15/12
Type of review: Statutory
Review number: 3
Triggering action date: 09/11/2007
Due date ***(five years after triggering action date)***: 09/11/2012

Issues and Recommendations Identified in the Five-Year Review: 1

OU(s): 2	Issue Category: Remedy Performance			
	Issue: Groundwater Extraction Well 2 is not currently operable.			
	Recommendation: Perform necessary repairs to bring EXT-2 back online			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	State	EPA	April 2013

OU(s): 2	Issue Category: Institutional Controls			
	Issue: Off-site plume area may not be covered by adequate institutional controls			
	Recommendation: Evaluate county ordinance to determine whether it provides protection from off-site plume and, if necessary, implement additional institutional controls			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	EPA	State	Dec. 2012

Protectiveness Statement(s)

Operable Unit: 1 *Protectiveness Determination:* Protective

Protectiveness Statement: The remedy at OU-1 protects human health and the environment in the long-term because there is no evidence of exposure to Site contaminants and the existing use is consistent with the stated objectives of the land use restrictions. The construction of the multi layer landfill cap, the collection of landfill gas and the maintenance of the Site perimeter fencing and signage effectively limit exposure to Site contaminants. Institutional controls in the form of a recently recorded restrictive covenant will ensure that the cover remedy remains protective in the long-term.

Protectiveness Statement(s)

Operable Unit: 2 *Protectiveness Determination:*

Short-term Protective

Protectiveness Statement: The remedy at OU-2 protects human health and the environment in the short-term because the remedy is operating as intended, treated groundwater is meeting stated standards and there is no evidence of exposure to contaminated groundwater. To be protective in the long-term, cleanup goals must be met for groundwater. Additionally, U.S. EPA must evaluate whether institutional controls are needed to prevent exposure to groundwater off-site and implement any necessary institutional controls until the groundwater cleanup goals are achieved.

Site wide Protectiveness Statement

Protectiveness Determination:

Short-term Protective

Protectiveness Statement: The remedy protects human health and the environment because there is no evidence of exposure to site contaminants and the existing uses are consistent with the stated objectives of the land use restrictions. The groundwater pump and treat system is operating as intended. Institutional controls have been recorded on the property as an environmental restrictive covenant that prevents interference with the cap and prohibits use of the groundwater under the Site. The remedy will be protective in the long-term when cleanup goals for groundwater are met. Additionally, U.S. EPA must evaluate whether institutional controls are needed to prevent exposure to groundwater off-site and implement any necessary institutional controls until the groundwater cleanup goals are achieved.

I. Introduction

The purpose of this five-year review is to establish that the remedy at the Site continues to be protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in five-year review reports. In addition, five-year review reports identify issues found during the review, if any, and identify recommendations to address them.

The Agency is preparing this five-year review report pursuant to CERCLA Section 121 and the National Contingency Plan (NCP). CERCLA Section 121 states:

> If the President selects a remedial action that results in any hazardous substances, pollutants or contaminants remaining at the Site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such Site in accordance with Section 104 or 106, the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.

The Agency interpreted this requirement further in the NCP; 40 C.F.R. § 300.430(f)(4)(ii) states:

> If a remedial action is selected that results in hazardous substances, pollutants or contaminants remaining at the Site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.

U.S. EPA completed the first Five Year Review Report on September 11, 2002 and completed the Second Five-Year Review Report on September 11, 2007.

This is the Third Five-Year Review Report for Douglas Road Landfill conducted by U.S. EPA, Region 5, and reviewed by the Indiana Department of Environmental Management (IDEM). During this reporting period, IDEM assumed operation and maintenance of OU-2. The triggering action for this statutory review is the date of the Second Five-Year Review Report on September 11, 2007.

II. Site Chronology

6/10/86	Proposed for inclusion on the National Priorities List (NPL)
3/31/89	Finalized on NPL
9/89	State of Indiana and Uniroyal signed a consent decree for performance of a Remedial Investigation/Feasibility Study (RI/FS)
11/91	Uniroyal files for bankruptcy and work ceases at the Site
8/94	U.S. EPA funded RI begins at the Site
7/95	RI/FS completion (OU-1)
7/13/95	Record of Decision (ROD) for OU-1 calling for a multi-layer cap over landfill
5/96	RI/FS completion (OU-2)
5/3/96	ROD for OU-2 calling for groundwater extraction and treatment through construction of an artificial wetland
8/94-6/96	Time critical removal action consisting of extension of city water to

	approximately 95 homes potentially impacted by groundwater contamination
2/95	Remedial Design (RD) start for OU-1 and OU-2
9/96	RD for OU-1 and OU-2 approved by U.S. EPA
1996	Consent Decree signed by bankruptcy trustee abandoning Site
9/96	Remedial Action (RA) start date - OU-2
9/97	RA start date - OU-1
2/99	Approximately 16 acres of property acquired by United States for U.S. EPA on which the wetland remedy for OU-2 will be constructed
2/99-11/99	On-Site remedy construction
5/00-6/00	Regrading and replanting of wetlands
8/00	Installation of filter strip by City of Mishawaka as part of OU-2
9/19/00	Preliminary Close-Out Report signed by U.S. EPA
9/11/02	First Five-Year Review
11/03	State takeover of O&M for OU-1
9/11/07	Second Five-Year Review
7/1/11	Early State takeover of O&M for OU-2

III. Background

Physical Characterization

The Douglas Road Landfill Site is in St Joseph County, just north of Mishawaka, Indiana. The Site is approximately 32 acres in size and located near the northwest corner of Douglas and Grape Roads. The Site includes the original 16 acres in the NPL Site description plus an additional 16 acres that U.S. EPA acquired to build an artificial wetland to treat contaminated groundwater. The Site is bounded by the right-of-way for the Indiana State Toll Road to the north, a shopping center and an apartment complex to the east, residential properties and Douglas Road to the south, and commercial development to the west. (See Figure 1)

Land and Resource Use

In the early 1950s, the Site was excavated to provide gravel for the construction of Interstate I-80/90. Uniroyal Plastics leased the gravel pit and used it to dispose of plant wastes between 1954 until the plant was closed in December 1979.

The current land use for the surrounding area is residential and increasingly commercial. The previous Five-Year Reviews for the Site anticipated that these land uses would continue into the foreseeable future, with more emphasis on commercial development. This development continues. The Site itself is currently fenced and the landfill contents are contained under an impermeable cap within the fenced area.

The groundwater near the Site was used as a drinking water source in the past. Because city water was extended to area residents, those immediately adjacent to the Site do not drink groundwater. The dominant groundwater flow direction is to the west/southwest towards the St. Joseph River, which is located approximately 1½ miles from the Site. Approximately ½ mile downgradient/southwest of the Site, there are residential properties with private drinking water wells and a State of Indiana wellhead protection area for the City of Mishawaka.

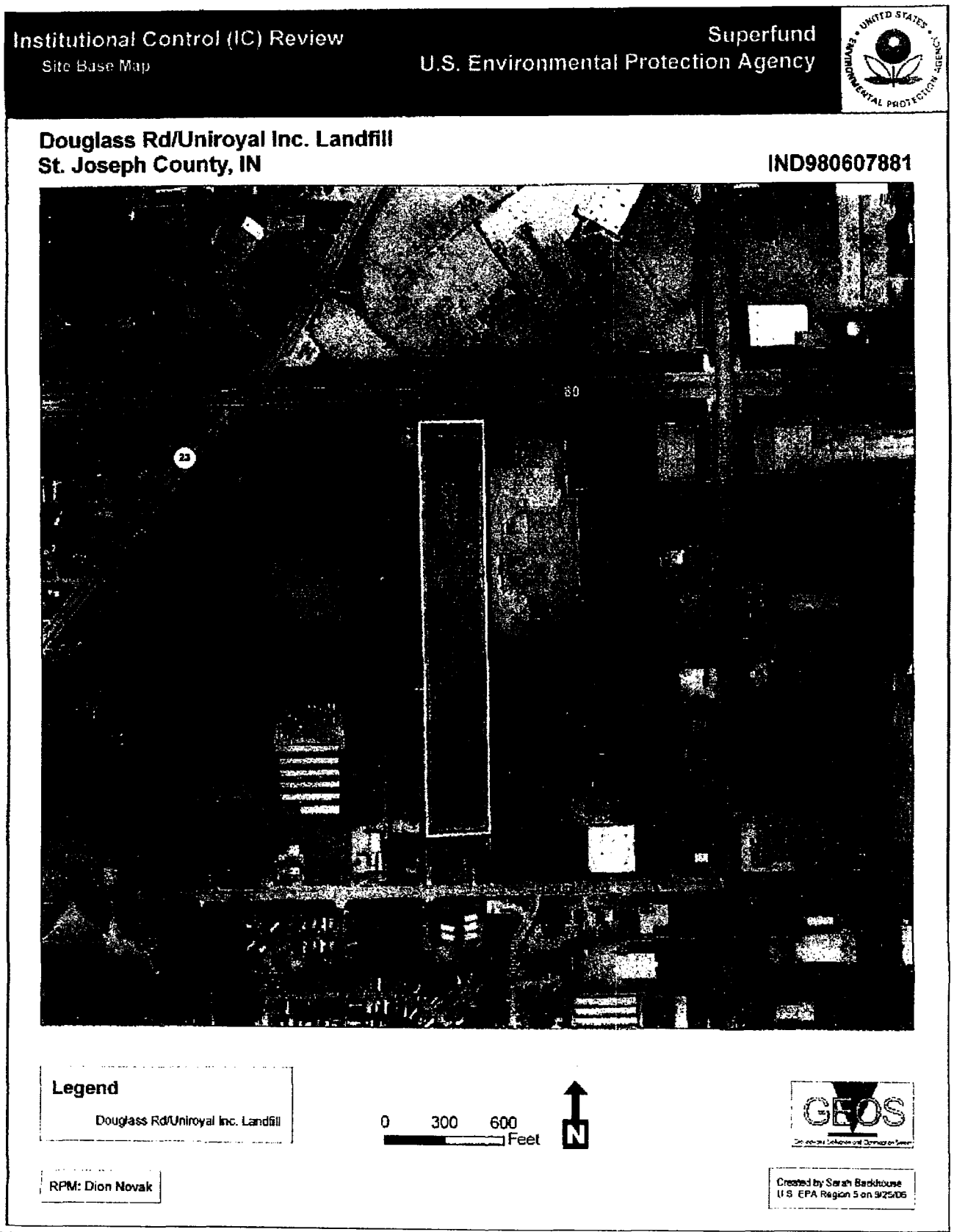

Figure 1 Site Map

History of Contamination

Uniroyal Plastics disposed of plant wastes at the Site from 1954 to 1979. From 1954 to 1971, Uniroyal disposed of solvents, fly ash, paper, wood stock, rubber and plastic scrap at the Site. Only fly ash was disposed from 1971 to 1979 when Uniroyal closed the Site to avoid complying with the impending RCRA regulations. According to company information, approximately 302,000 gallons of liquid waste were disposed at the Site, including methyl ethyl ketone, acetone, tetrahydrofuran, toluene, hexane, and xylene. Historical aerial photos of the Site indicate several pits containing liquids. The largest was in the central part of the Site.

Initial Response

U.S. EPA proposed the Site for the National Priorities List (NPL) on June 10, 1986, and the listing was finalized on the NPL on March 31, 1989. U.S. EPA determined that the Site remediation could be split into operable units to facilitate the remedy selection process and allow more time to study the groundwater contamination issues.

OU-1 addressed the landfill and OU-2 addressed the groundwater contamination issues. In September 1994, the Region made the RI results for OU-1 available to the public and discussed potential responses for residential well contamination discovered in areas southwest of the Site. U.S. EPA decided that an extension of city water to 95 homes was the appropriate solution to the off-site groundwater contamination. The area chosen for city water included the handful of homes with contaminated well-water supplies and those in the immediate area of potential impacts from the groundwater plume.

In April 1995, the Region proposed a plan for OU-1, thus starting the public comment period. U.S. EPA held a public meeting on April 5, 1995, at which time U.S. EPA discussed the proposed remedy for OU-1 and accepted public comment.

On September 13, 1995, U.S. EPA held an availability session to assist homeowners to complete the requisite paperwork for city water hookup. U.S. EPA released its proposed plan for OU-2 to the public in November 1995, and extended the public comment period to January 25, 1996, a total of 60 days, in response to a request made during the public comment period. U.S. EPA completed the extension of city water to affected residents in June 1996 through an emergency removal action.

Basis for Taking Action

Contaminants: Hazardous substances released at the Site in each media include:

Soil:
Dioxin
PCBs
Arsenic
Benzo(a) pyrene
Beryllium
Dibenzo(a,h) anthracene
Bis (2-ethylhexyl) phthalate
Benzo(b) fluoranthene

Benzo(b) anthracene
Chromium
Antimony
Nickel

Groundwater:

Arsenic
Vinyl Chloride
Trichloroethene
Bis (2-ethylhexyl) phthalate
Dibenzo (a,h) anthracene
Indeno (1,2,3-c,d) pyrene
Manganese
Tetrahydrofuran

Exposure to contaminated soil, via dermal contact and ingestion, and groundwater, via inhalation and ingestion, results in significant human health risks due to exceedances of U.S. EPA's risk management criteria for either the average or the reasonable maximum exposure scenarios. The carcinogenic risks were highest for exposures to contaminated groundwater due to high concentrations of vinyl chloride and TCE. Non-carcinogenic risks were highest for exposure to manganese concentrations in groundwater. Risks from exposure to soil were significant due to the presence of dioxin, PCBs, PAHs and bis (2-ethylhexyl) phthalates.

An ecological risk assessment found that ecological damage from surface soil and groundwater contamination was likely in the absence of remedial action for the Site.

IV. Remedial Actions

Remedy Selection

The RODs for the Site were signed on July 13, 1995 (OU-1) and May 3, 1996 (OU-2). The remedial action objectives (RAOs) for OU-1 were to remediate contaminated on-Site soil and waste material. To address this RAO, the major components of the remedy for OU-1 included the following:

1. Installation of a composite barrier cap with a geosynthetic clay liner (GCL) soil barrier layer, meeting the requirements of 329 IAC 2-14-19
2. Collection and disposal of landfill gas
3. Perimeter ditches to collect surface water drainage
4. Groundwater and source area monitoring (including landfill gas)
5. Access restrictions and deed restrictions to limit Site development and prohibit groundwater use

The RAOs for OU-2 were to address contaminated groundwater, both on and off-Site. To address these RAOs, the major components of the remedy for OU-2 include the following:

1. Groundwater extraction using extraction wells or collection drains to contain groundwater in the down-gradient direction of the groundwater plume

2. Groundwater treatment through construction of an artificial wetland
3. Re-infiltration, to the maximum extent practicable, of the extracted groundwater that has undergone treatment in the constructed wetland
4. Discharge to Juday Creek of the remainder of the treated groundwater, in compliance with NPDES substantive and administrative requirements
5. Groundwater and source area monitoring to ensure that the goals of this action are met and down-gradient water supplies are not adversely impacted by groundwater contamination
6. Long term operation and maintenance of the remedy to ensure protection of public health and the environment

Institutional Controls

Institutional controls (ICs) are non-engineered instruments, such as administrative or legal controls, that help minimize the potential for exposure to contamination and protect the integrity of the remedy. Compliance with ICs is required to assure long-term protectiveness for any areas which do not allow for unlimited use or unrestricted exposure (UU/UE).

Table 1 Institutional Controls Summary Table

Media, Engineered Controls, & Areas that Do Not Support UU/UE Based on Current Conditions	Institutional Control Objective	Title of Institutional Control Instrument Implemented
Douglas Road Landfill Property - Uniroyal parcel - east half Constructed Subtitle C landfill cap Area also exceeds ground water standards	Prohibit construction and any Site development; prohibit use of groundwater beneath the Site	Environmental Restrictive Covenant (ERC) signed and recorded by IDEM (12/21/2011), See Attachment

Maps which depict the current conditions of the Site and areas which do not allow for UU/UE were developed as part of the implementation plan for the ICs required in the previous Five Year Review (See Figure 1).

Institutional controls were required for the Douglas Road Landfill property by the OU-1 ROD in the form of restrictive covenants to limit the use of the Site for construction or other Site development and to prohibit the use of groundwater under the Site for any purpose. Access restrictions are required for the Site in the form of fencing to restrict Site access and warning signs to state the potential hazards posed by the Site. The fencing and warning signs were completed as part of the construction of the remedial action and have been consistently maintained since that time. Although not ICs, the fencing and warning signs also serve to meet IC objectives.

Uniroyal parcel-east half: The NPL Site was owned originally by Uniroyal. This ownership continued throughout the RI/FS. Uniroyal declared bankruptcy in 1991 and remanded control of the property to a court appointed trustee. This trustee officially "abandoned" the Site in 1996 via a consent decree (Stipulation and Order -Case No. 91-33364HCD) and U.S. EPA and Indiana Department of Environmental Management (IDEM) were granted perpetual Site access to construct, operate and maintain the Site remedy by this stipulation and order. On December 21, 2011, IDEM recorded an Environmental Restrictive Covenant that prohibits the use of groundwater at the Site for any purpose, excavation or construction activities unless approved by EPA, residential use, and growing food crops at the Site.

United States property-west half: The ROD for OU-2 did not require any institutional controls on this property. The current owner is the United States pursuant to the property purchase from two private owners in February 1999. Treated groundwater is meeting stated standards and there is no evidence of exposure to contaminated groundwater.

The ROD for OU 2 did not require institutional controls on the off-site groundwater plume area. The remedy is reducing the contaminant concentrations in the off-site plume but concentrations remain above ROD performance standards in some off-site monitoring wells. Area residents in 95 homes were hooked up to the municipal water supply as part of the Site remedy. The area that received the city water included homes with contaminated well-water supplies and those in the immediate area of potential impacts from the groundwater plume. Because the off-site groundwater plume does not allow for unlimited use and unrestricted exposure, U.S. EPA plans to issue an Explanation of Significant Differences to modify the remedy to require institutional controls to prevent exposure to the off-site contaminated groundwater plume. St. Joseph County enacted a groundwater well ordinance in 2007 that restricts groundwater well access in the area of the off-site plume. U.S. EPA will assess this ordinance to determine whether it provides sufficient protection in the area of the off-site plume, will work with St. Joseph County to address any issues that arise from the review and, if necessary, will implement any additional institutional controls.

Compliance with the stated objectives of the ICs was also evaluated during the five-year review by inspections and interviews. According to inspections, there is no current use of the landfill. Industrial uses on adjacent parcels are not anticipated to impact the landfill. The hazardous waste landfill cap must remain in place indefinitely to prevent exposure to underlying waste. The property is currently zoned for industrial use.

As confirmed in the IC table above, ICs have been implemented and recorded at the Site as required by the ROD for OU 1. These ICs are needed for long term Site stewardship and permanence of the Site remedies.

Remedy Implementation

The remedial action took place in two phases. The first phase consisted of the extension of city water from the towns of Mishawaka and South Bend to approximately 95 homes. This action was undertaken as a time critical emergency removal action from August 1994 until completion in June 1996.

The second phase consisted of all other remedial activities. U.S. EPA determined that both OUs should be constructed simultaneously as the materials excavated from the wetlands area were used as the base

in the multi-layer landfill cap.

From February 1999 to November 1999, the Agency constructed the following remedy components:
- Groundwater extraction and treatment with artificial wetland system
- Clearing and grubbing of entire Site
- Installation of five groundwater extraction wells
- Installation of 14 additional groundwater monitoring wells (Site total of 36)
- Excavation of four wetland cells
- Rough and final grading of wetlands area
- Liner placement in wetland cells
- Earth backfill in wetland cells
- Wetlands planting with cattails and bulrush plants
- Seeding of wetlands area

Landfill cap system:
- Regrading of landfill Site in preparation for capping
- Gas collection vent installation
- Installation of GCL liner and polyvinyl chloride (PVC) liner
- Excavation of surface water drainage trenches
- Placement of cap cover soils

From May 2000 to June 2000, the following activities occurred:
- Regrading of wetlands area and replanting of wetlands plants that did not survive initial 1999 planting
- Drainage trench repair and seeding of landfill cap
- Replacement of Site fencing
- Installation of Site access roads

In August 2000, the following activities occurred:

- Installation of filter strip by the City of Mishawaka that will convey shared discharge to Juday Creek
- Operation and maintenance of filter strip and entire storm sewer system constructed by the City of Mishawaka

The Site achieved construction completion status when the Preliminary Close Out Report was signed on September 19, 2000.

U.S. EPA and the State have previously determined that all RA construction activities were performed in accordance with specifications. Off-Site groundwater contaminant levels continue to decrease, as is shown in the annual Site data reports. On-Site contaminant levels have also been decreasing but the Agency expects that on-Site cleanup to ROD groundwater standards will take many years to achieve. After groundwater cleanup levels have been met, U.S. EPA will issue a Final Closeout Report.

System Operation

Primary activities associated with Site O&M, include:
- Measuring and recording flow rate and total flow from the flow meter for each extraction well
- Inspecting, recording, and adjusting water levels for the wetland cells and infiltration basin
- Removing debris buildup and trash from influent and effluent piping, stop logs, storm water

management facilities, perimeter drainage ditches, and the perimeter fence
- Inspecting the Juday Creek filter strip to ensure it is free from any obstructions
- Examining the condition of pumps
- Inspecting and characterizing wetland vegetation - replant as needed
- Inspecting the structural integrity of berms and perimeter ditches
- Performing regular management of berm vegetation
- Inspecting all signage, fences, gates, and locks for integrity
- Inspecting, controlling, and removing nuisance plant and animal species
- Inspecting landfill cap integrity and mowing at least 1/3 of the cap and all perimeter and wetlands area vegetation yearly
- Removing deposited mineral material and sediment from piping
- Monitoring of progress of remediation by sampling 36 Site monitoring wells and 5 on-Site extraction wells
- Monitoring of extracted groundwater (influent) and treated effluent
- Collection of surface water, sediment, fish tissue, and invertebrate tissue samples (discontinued in May 2004)
- Monitoring of landfill gas and methane to maintain compliance with federal and State regulations

Chronology of significant events following remedy construction:

3/26/02	Signing of intergovernmental agreement between U.S. EPA and the City of Mishawaka to allow discharge of excess treated groundwater through City property to Juday Creek
9/02	Landfill gas collection system switched to active collection
9/11/02	First Five-Year Review completed
11/1/03	IDEM assumes operation and maintenance activities for landfill cap (OU-1)
3/06	Geoprobe survey completed in off-Site plume area
5/04	Extraction discontinued from Extraction well 5 (EXT5, an off-Site extraction well)
8/06	EXT 2 shutdown (on-Site extraction well)
8/06	Contractor switch to Sultrac
5/04	Juday Creek sampling discontinued
8/06	EXT-5 - active extraction restarted
7/07	Douglas Road widening project, intergovernmental agreement with City of South Bend
9/09	IDEM contractor change to Keramida
6/11	EXT-2 shutdown due to hole in well casing
7/11	IDEM takes over early O&M responsibilities for OU-2
9/11	EXT-1 shutdown due to high water levels in wetlands system
10/11	EXT-5 shutdown to high water levels in wetlands system
11/11	SSC mandated that IDEM take over O&M responsibilities
1/12	Detailed perimeter drainage system survey

V. Progress Since the Last Five-Year Review

The First Five-Year Review Report found the remedies at both OU-1 and OU-2 to be protective in the short-term until required ICs were implemented. The Second Five-Year Review Report found the remedies to be protective in the short term and identified three issues and recommendations that are summarized in Table 2 with follow-up actions to be taken:

Table 2 Actions Taken Since the Last Five-Year Review

Issues	Recommendations and Follow-up Actions	Party Responsible	Milestone Date	Action Taken and Milestone	Date of Action
Impact of updated arsenic MCL on Site remedy	Analysis of impacts on Site remedy protectiveness	U.S. EPA	12/09	No impact as remedy is containment and wetland effluent is meeting State standards	Ongoing—remedy continues to provide containment
Future O&M responsibilities for OU-2 pursuant to State Superfund Contract	Ensure that OU-2 O&M is transferred to IDEM as previously agreed	U.S. EPA	11/11/11	IDEM assumed Site O&M responsibilities	7/1/11
Implementing and maintaining effective ICs are required to assure protectiveness of the remedy	Prepare IC plan for IC implementation and long term stewardship	U.S. EPA /IDEM	09/08/12	Restrictive covenant signed and recorded for OU-1	12/21/11

VI. Five-Year Review Process

Administrative Components

The five-year review team was led by Dion Novak, Remedial Project Manager (RPM) for the Site; Kevin Herron from the IDEM; Rob Fedorchak, on-Site contractor for IDEM; and Gary West, City of Mishawaka. These persons participated in a Site visit on March 15, 2012.

This five-year review process began on January 15, 2012, and ended on April 1, 2012. This occurred as a phone conversation between the U.S. EPA RPM and the State project manager (SPM), where the SPM was asked to prepare a summary of the State-led O&M activities for the landfill cap since State takeover in 2003. The review team established the review schedule whose components included:

- Site inspection
- Document review
- Data review and summary report
- Five-year review report development and review

Community Involvement

A notice was placed in the South Bend Tribune on May 27, 2012, announcing that the five-year review for the Site was underway, and that the results of the review and the report would be available to the public at the Site repositories, at U.S. EPA Region 5 offices, and online at www.usepa.gov/region5/superfundlfiveyear/fyrindex_html.

Site Inspection

The following issues were identified during the Site visit, most of which are summarized below in the data review section: weeds and settlement issues in the perimeter drainage ditches; areas of settlement in the landfill cap particularly on the east side; well EXT-2 was found to be inoperable; wells EXT-1, 2 and 3 well flow meters are inoperable; wells EXT-2, 3 and 4 back flow check valves are not functioning properly; and the filter strip was overgrown with weeds along its length.

Document Review

This five-year review consisted of a review of relevant Site documents including:

- Previous five-year review report dated September 11, 2007
- Correspondence related to ongoing operation and maintenance activities, including O&M information provided by IDEM from its work on the Uniroyal property
- Annual Site summary reports
- Property title information

Data Review

Landfill cap maintenance - OU-1

IDEM has performed O&M for the landfill cap since November 2003. In September 2009, IDEM changed contractors for the cap maintenance from Ecology & Environment, Inc. to Keramida Environmental, Inc. This includes cap maintenance activities, inspections three times a week of the cap, as well as quarterly monitoring of perimeter methane gas levels for regulatory compliance and landfill gas emissions.

Issues relating to O&M since the last five-year review include: locking the main gate, damage to the cap due to groundhogs, nuisance plant species on the cap, water ponding in the perimeter drainage ditch, the growth of trees in the perimeter drainage ditch, perimeter wear of the Site access road, cap settlement in three areas, and erosion in four areas.

Historically, locks on the main gate have been found to be inappropriately connected or new ones have been installed that potentially restrict access to Agency personnel. These are usually cut off when discovered but recur with some regularity. IDEM placed a warning sign in October 2011 which has addressed this issue and no new locks have been discovered since installation. Trapping groundhogs discovered in April 2011 is ongoing to prevent any damage to the cap. Portions of the landfill cap were sprayed in October 2011 to control nuisance plant species of phragmites and the entire perimeter ditch was sprayed to control woody vegetation. The wear of the Site perimeter access road, cap settlement, and erosion and water ponding in the perimeter ditch are being addressed during spring 2012

maintenance activities. None of these activities appear to be significantly affecting the overall performance of the landfill cap system.

The landfill gas collection system was inspected three times per week to ensure that the system is operational, drain the moisture separator, check the pressure gauges, make any necessary adjustments and maintain and check the integrity of the equipment shed. Landfill gas is monitored on a quarterly basis for methane, carbon dioxide and oxygen. Effluent vapor samples from the blower discharge are also monitored for VOCs quarterly. Approximately 15.82 tons of VOCs and approximately 14.38 tons of hazardous air pollutants (HAPs) have been emitted since September 2009. These results did not exceed the major source thresholds at 326 IAC 2-7-1(22) – 10 tons (20,000 lbs) per year of a single HAP, as defined under Section 112(b) of the Clean Air Act, and 25 tons (50,000 lbs) per year of any combination of HAPs. Consequently, an air permit is not required for these emissions.

Further issues related to O&M since the last five-year review include: collection of leachate in the blower system gas collection lines at various times, rotten equipment shed doors, water leak into the equipment shed, broken pressure gauges, and a broken gate valve on the vent well.

The leachate that collected in the blower system collection lines was flushed out and disposed of in the OU-2 wetlands. The doors and framing were replaced and resealed in October 2010. A new gate valve was installed at the vent well in September 2010. At present, none of these issues are affecting the overall performance of the blower system.

The perimeter landfill gas monitoring probes are monitored quarterly for methane, carbon dioxide and oxygen. Methane levels continue to be below the action levels at all monitoring locations.

Groundwater extraction and treatment/monitoring-OU-2

Operational issues associated with the groundwater extraction and wetlands treatment system typically revolve around algae control and the annual dredging of the infiltration basin, which is wetland cell 4, and operational issues with the extraction wells. Infiltration is limited by the production of algae, which can clog the cell intake as well as the infiltration area. Introduction of wetlands vegetation has limited algae growth, but it still remains a problem for infiltration efficiency. To increase infiltration, the basin is dredged annually.

Issues identified in O&M during this reporting period include: a leak inside the EXT-4 vault, removing the pump stuck in EXT-2, the inoperable status of EXT-2, the installation of flow meters at EXT-1, 2 and 3, the installation of back flow valves to replace the broken valves in EXT-2, 3 and 4, replacement of backup batteries in the control panels, and inoperable phone service.

Replacement backup batteries for the control panels were installed in December 2011, at which time the phone service (which was inoperable due to an account transfer issue) was reinstated. Well repair estimates were requested for the remaining well repair issues. At present, none of these issues appear to be affecting the overall performance of the extraction/treatment system, with the exception of the inoperability of EXT-2, which impacts groundwater containment at the Site.

The wetland treatment system has consistently reduced influent VOC concentrations to levels below NPDES discharge criteria, which were identified in the ROD as the Site cleanup standards (See Table 3). Currently all water is discharged back into the environment via the infiltration basin and none is

discharged off-site. Monthly samples of system influent and effluent are collected to verify that the system is operating as designed.

Further issues associated with O&M of the wetlands include: clogged discharge piping, an anomalous arsenic detection and nuisance plant species in the wetlands.

The ROD did not require restrictions on the off-site plume area although residents were hooked up to the municipal water supply as part of the Site remedy. The remedy is reducing the contaminant concentrations in the off-site plume but concentrations remain above ROD performance standards in some off-site wells. St. Joseph County enacted a groundwater well ordinance in 2007 that restricts groundwater well access in the area of the off-site plume. U.S. EPA will assess this ordinance to determine if it provides sufficient protection in the area of the off-site plume and will work with St. Joseph County to address any issues that arise from the review.

Table 3 Effluent Discharge Criteria

Parameter	On-Site Influent Conc. (ppb)	Off-Site Influent Conc. (ppb)	Combined Influent Conc. (ppb)	Effluent Discharge Criteria (ppb)
CA	15.8	ND	7.9	NA
Acetone	35.9	ND	17.95	109
Isophorone	0.2	ND	0.1	50
THF	2351.20	ND	1175.6	25
Benzene	10.2	ND	5.1	5
4 Methyl-2-pentanone	40.6	ND	20.3	15
Toluene	93.8	ND	46.9	50
Chlorobenzene	2.8	ND	1.4	50
Ethylbenzene	20.3	ND	10.15	700
Xylenes	31.3	ND	15.65	10
1,1 DCA	0.03	ND	0.015	90
1,2 DCA	2.5	ND	1.25	5
4-Methylphenol	2.8	ND	1.4	296
BEP	5.2	ND	2.6	343.8
1,3-DCB	1	ND	0.5	NA
2-Methylphenol	0.8	ND	0.4	420
Iron	7062.7	10.7	3536.7	1000
Arsenic	12.7	1.4	7.05	BG(1-5)
di-n-butylphthalate	0.8	ND	0.4	12.7
VC	ND	3.6	1.8	2
TCE	ND	8.7	4.35	5
c-1,2 DCE	ND	0.2	0.1	70
Manganese	ND	13.3	6.65	NA
Total flow = 832 gpm (wells option) or 560 gpm (drains option) BG – Background concentration				

The screens on the discharge pipe were cleaned of vegetation several times during this review period. Clogged piping leads to higher water levels in the wetland cells which can impact cell operations but

screen clearing remedies this problem. A single detection of arsenic in July 2011 above the discharge standard was anomalous and it has not been detected since that time. Portions of the wetlands were sprayed in October 2011 to control nuisance plant species of phragmites and purple loose strife. The filter strip area was identified as needing significant maintenance, including removal of weeds and verification of the viability of the discharge piping and system operations. An on-site water basin that was installed at the front part of the Site also needed significant maintenance to removal weed and woody materials that had overgrown since the basin was installed as part of the widening of Douglas Road. All of this repair work was completed during the week of April 2 by the City of Mishawaka pursuant to the Interagency Agreement between the City of Mishawaka and U.S. EPA.

Groundwater monitoring at 36 monitoring wells has been conducted at the Site since the start of the RI. A report is prepared annually that documents data collected and discusses groundwater trends since the onset of system operations. Recent annual groundwater monitoring results show consistent concentrations over time from monitoring wells. These results show decreasing concentrations in on-site monitoring wells as well as in off-site wells, demonstrating that groundwater extraction and treatment is progressing towards achievement of cleanup goals.

VII. Technical Assessment

Question A: Is the remedy functioning as intended by the decision documents?

Yes.

The review of documents, ARARs, risk assumptions, and the results of the Site inspection indicates that the remedy is functioning as intended by the RODs for the Site. The stabilization and capping of contaminated soils has achieved the RAOs to prevent the direct contact with or ingestion of contaminants in soil at the Site and the collection and treatment of groundwater is making significant progress towards achieving RAOs.

There are no breaches to the cap and cover vegetation is uniform across the Site. This cap must remain in place indefinitely to prevent any contact with waste materials. Site access is restricted at present with fencing and signage, as required by the ROD. An environmental covenant was recently signed and recorded on the Uniroyal Site parcel. Compliance with ICs is required to ensure that the remedy continues to function as intended. Based on inspections and interviews, there appears to be compliance with the stated objectives of the land and groundwater use restrictions. U.S. EPA and IDEM have routinely inspected, sampled, and monitored the Site to ensure that the remedy remains protective.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of remedy selection still valid?

Yes.

There have been no changes in the physical conditions of the Site that would affect the protectiveness of the remedy. The RAOs in place at the time of remedy selection remain valid. The reduction in arsenic MCL that was documented as an issue in the last five-year review was determined to have no impact on the protectiveness of the remedy.

Question C: Has any other information come to light that could call into question the protectiveness of

the remedy?

There is no other information that calls into question the protectiveness of the remedy.

Changes in standards and to be considereds

There was one change in ARARs at the Site subsequent to the First Five-Year Review for the Site that was documented in the Second Five-Year Review. The MCL for arsenic was updated from 50 ppb as outlined in the ROD to 10 ppb, which became effective in January 2006. The impacts on the long-term protectiveness of the Site remedy from this change in standard were evaluated and the change was determined to have no impact on remedy protectiveness. The main goal of the Site groundwater remedy is containment. The groundwater plume extraction and constructed wetland treatment system is operating effectively and treating groundwater to the appropriate cleanup levels, including the updated arsenic MCL, as evidenced by groundwater influent and effluent sampling data reported annually.

Changes in exposure pathways

There have been no changes in exposure pathways since the ROD was signed.

Changes in toxicity and other contaminant characteristics

There have been no changes in contaminant characteristics during this reporting period that would impact remedy protectiveness.

Changes in risk assessment methods

There have been no changes in risk assessment methods that would impact remedy protectiveness.

Expected progress towards meeting RAOs

The remedy performance is progressing as expected and it is anticipated to continue to meet RAOs. Contaminant concentrations in on-site monitoring wells continue to trend downward and off-site contaminant levels are consistently decreasing as demonstrated by the groundwater monitoring performed yearly at the Site.

Technical Assessment Summary

According to the data reviewed and the Site inspection, the remedy is functioning as intended by the ROD. There have been no changes in the physical conditions of the Site that would impact the protectiveness of the remedy.

Contaminant concentrations in on-site monitoring wells are decreasing and off-site monitoring concentrations are also decreasing, demonstrating that the landfill cap is achieving design objectives. Continued monitoring for the wetland system influent continues to be below discharge standards for the Site and this monitoring was discontinued in 2006. System effluent concentrations have consistently been monitored as below Site discharge standards, showing that the system is successfully accomplishing ROD and design objectives. There have been no changes in the toxicity factors for the contaminants of concern that were used in the baseline risk assessment, and there have been no changes

to the standardized risk assessment methodology that could affect the protectiveness of the remedy. There is no other information that calls into question the protectiveness of the remedy.

Fencing and signage were installed as part of remedy construction and are currently in place at the Site and functioning as designed.

VIII. Issues

The following issues were identified for the Site during this Five-Year Review:

Table 4 Issues

Issue	Affects Current Protectiveness (Y/N)	Affects Future Protectiveness? (Y/N)
Well EXT-2 is currently not operational	N	Y
Off-site plume area may not be covered by adequate ICs	N	Y

IX. Recommendations and Follow-Up Actions

Recommendations and follow-up actions are summarized in Table 5.

Table 5 Recommendations and Follow-up Actions

Issues	Recommendations and Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Y/N)	
					Current	Future
Well EXT-2 is currently not operational	Complete necessary repairs to bring EXT-2 online	IDEM	U.S. EPA	April 2013	N	Y
Off-site plume area may not be covered by adequate ICs	Evaluate county ordinance to determine whether it provides sufficient protection from off-site plume and, if necessary, implement additional ICs	U.S. EPA	IDEM	December 2012	N	Y

X. Protectiveness Statement

The remedy at OU-1 protects human health and the environment in the long-term because there is no evidence of exposure to Site contaminants and the existing use is consistent with the stated objectives of the land use restrictions. The construction of the multi layer landfill cap, the collection of landfill gas and the maintenance of the Site perimeter fencing and signage effectively limit exposure to Site contaminants. Institutional controls in the form of a restrictive covenant will ensure that the cover remedy remains protective in the long-term.

The remedy at OU-2 protects human health and the environment in the short-term because the remedy is operating as intended, treated groundwater is meeting state standards and there is no evidence of exposure to contaminated groundwater. To be protective in the long-term, cleanup goals must be met for groundwater. Additionally, U.S. EPA must evaluate whether institutional controls are needed to prevent exposure to groundwater off-site and implement any necessary institutional controls until the cleanup goals are achieved.

The remedy protects human health and the environment because there is no evidence of exposure to site contaminants and the existing use is consistent with the stated objectives of the land use restrictions. The groundwater pump and treat system is operating as intended. Institutional controls have been recorded on the property as an environmental restrictive covenant that prevents interference with the cap and prohibits use of the groundwater under the Site. Additionally, U.S. EPA must evaluate whether institutional controls are needed to prevent exposure to groundwater off-site and implement any necessary institutional controls until the groundwater cleanup goals are achieved.

XI. Next Review

The next five-year review for the Douglas Road Site is required five years from the date of this review.